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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/787,276

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Peter D. Brewer

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EXAMINER

PHAM, THANHHA S

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

07/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/787,276

Applicant(s)

BREWER, PETER D.

Examiner

Thanhha Pham

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 9-12 and 18-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9-12, 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

This Office Action is in response to Applicant's Amendment dated 5/7/2007.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. **Claims 1-3 and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujisada et al [JP 58-18928].**

****Notice: This rejection is based on a broad scope of claimed wherein a planar protective layer is a protective layer comprising a planar portion since applicant does not recite characteristics of a planar protective layer having a completely planar top surface that completely covers the semiconductor surface and the defects.*

► With respect to claims 1-3, Fujisada et al (figs 1's-2's and text pages 119-120) discloses a method for removing defect (2, fig 1's-2's) from a semiconductor surface (1) comprising:

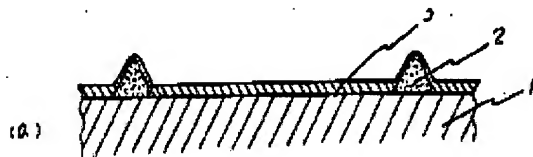
coating the semiconductor surface (surface of wafer 1, fig 2a) and the defects (2) with a protective layer (3), wherein the protective layer has a planar top surface (see

figure below), the protective layer uniformly covers the defects prior to a step of thinning, wherein the planar protective layer is a photoresist layer;

thinning the planar protective layer (3, fig 2b) to selectively reveal top portions of the defects (2);

removing the defects (figs 2b-2c) and

removing the planar protective layer (3, fig 2d).



► With respect to claim 18, Fujisada et al discloses removing of the defects (2) is performed by etching.

► With respect to claim 19, a process of thinning the planar protective layer of Fujisada et al is identical to a process for removing the planar protective since both process removes the same material of planar protective layer from the surface of the semiconductor wafer.

► With respect to claim 20, Fujisada et al (text part 3 in page 119) discloses the semiconductor surface (surface of wafer 1) comprises a semiconductor selected from a group consisting of GaSb, InAs, Si, InP, GaAs, InAs and AlSb.

2. Claims 1-3, 11, 18-20 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Dokumaci et al [US 6,642,147].

► With respect to claims 1-3, Dokumaci et al (figs 1-15 and cols 1-6) discloses a method for removing defect (4', fig 2) from a semiconductor surface (3) comprising:

coating the semiconductor surface (surface of layer 3, fig 3a) and the defects (4') with a protective layer (5'), wherein the protective layer has a planar top surface, the protective layer uniformly covers the defects prior to a step of thinning, wherein the planar protective layer is a photoresist layer;

thinning the planar protective layer to selectively reveal top portions of the defects (4', fig 3b);

removing the defects (figs 3b-4); and

removing the planar protective layer (5, figs 4-5).

- ▶ With respect to claims 11 and 19, a process of thinning the planar protective layer of Dokumaci et al is identical to a process for removing the planar protective since both process removes the same material of protective layer using oxygen plasma (RIE)
- ▶ With respect to claims 18 and 21, Dokumaci et al discloses removing of the defects (4') is performed by etching using a wet chemical etchant (col 5 lines 38-51).
- ▶ With respect to claim 20, Dokumaci et al discloses the semiconductor surface (surface of layer 3) comprises a semiconductor (silicon) selected from a group consisting of GaSb, InAs, Si, InP, GaAs, InAs and AlSb.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 4-5 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujisada et al [JP 58-18928] as applied to claim 3 above, in further view of Kudo et al [JP 63-216346] or Nagayama et al [JP 4070704147].

► With respect to claims 9, 11 and 12, Fujisada et al substantially discloses the claimed method including thinning the planar protective layer of photoresist. Fujisada et al does not specifically mention how to thin the planar protective layer of the photoresist layer. More particularly, Fujisada et al does not expressly teach using ICP oxygen process, RIE or ERC for thinning the protective layer of photoresist. However, ICP oxygen process, RIE and ERC are known technique to etch/remove photoresist material. See Nagayama et al and Kudo et al as evidences that shows using ICP oxygen process, RIE or ERC for removing photoresist material. Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of Chiu et al or Kuo et al, to use the ICP oxygen process, RIE or ERC as known technique for removing photoresist material of the planar protective layer in the thinning step process of Fujisada et al to reveal portions of the defects for removing said defects to provide a better semiconductor device.

► With respect to claims 4-5 and 10, the claimed range thickness of the photoresist layer and the etch rate of the thinning process are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in In re Aller 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Moreover, the claims are prima facie obvious without showing that the claimed ranges achieve unexpected results. *See In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990); In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996); In re Boesch, 205 USPQ 215 (CCPA 1980).*

4. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujisada et al [JP 58-18928] as applied to claim 1 above, in further view of Takehiko et al [JP 06041770] or Skee et al [US 5,989,353]

Fujisada et al substantially discloses the claimed method including removing the defects from the semiconductor surface by etching. Fujisada et al does not expressly

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teach using a wet chemical etchant **[claim 21]** to remove the defect wherein the defects are removed by a chemical etchant selected from the group consisting of citric acid, HCl and acetic acid **[claim 22]** or the group consisting of : i) a KOH (potassium hydroxide), water, isopropyl alcohol additive solution; ii) an ethylene diamine pyrocathecol, water, pyrazine additive solution; iii) a TMAH (tetramethyl ammonium hydroxide), water solution; and iv) a hydrazine (N_2H_4), water, isopropyl alcohol solution **[claim 23]**.

However, Takehiko et al and Skee et al teach using the wet chemical etchant to clean/remove defects to the semiconductor surface. Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view Takehiko et al or Skee et al, to use the wet chemical etchant as being claimed as known etchants to clean the semiconductor surface in the process of Fujisada et al to remove the defect for providing a better semiconductor device. Selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301. See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious).

5. Claims 4-5, 9-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dokumaci et al [US 6,642,147] in view of of Kudo et al [JP 63-216346] or Nagayama et al [JP 4070704147].

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► With respect to claims 9, 11 and 12, Dokumaci et al substantially discloses the claimed method including thinning the planar protective layer of photoresist. Dokumaci et al does not expressly teach using ICP oxygen process or ERC for thinning the protective layer of photoresist. However, ICP oxygen process and ERC are known technique to etch/remove photoresist material. See Nagayama et al and Kudo et al as evidences that shows using ICP oxygen process or ERC for removing photoresist material. Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of Chiu et al or Kuo et al, to use the ICP oxygen process or ERC as known technique for removing photoresist material of the planar protective layer in the thinning step process of Dokumaci et al to reveal portions of the defects for removing said defects to provide a better semiconductor device.

► With respect to claims 4-5 and 10, the claimed range thickness of the photoresist layer and the etch rate of the thinning process are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such

criticality... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Moreover, the claims are prima facie obvious without showing that the claimed ranges achieve unexpected results. *See In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990); In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996); In re Boesch, 205 USPQ 215 (CCPA 1980).*

6. Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dokumaci et al [US 6,642,147] as applied to claim 1 above, in further view of Takehiko et al [JP 06041770] or Skee et al [US 5,989,353]

With respect to claims 22 and 23, citric acid, HCl, acetic acid, mixture of KOH (potassium hydroxide), water & isopropyl alcohol additive solution, mixture of an ethylene diamine pyrocatechol, water & pyrazine additive solution, mixture of TMAH (tetramethyl ammonium hydroxide) & water solution, mixture of hydrazine (N₂H₄), water, & isopropyl alcohol solution are known wet chemical etchants for cleaning semiconductor surface. See Takehiko et al and Skee et al as evidences. Selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S.

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327, 65 USPQ 297 (1945) "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301. See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious).


Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to [redacted] whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TSP



THANHHA S. PHAM
PRIMARY EXAMINER